

REMARKS

Reconsideration and allowance of the identified application is respectfully requested in light of the above amendments and the following remarks.

The Election Requirement

The applicant hereby confirms the election of Claims 1-16 for prosecution in this application. Non-elected Claims 17-20 have been cancelled, while expressly reserving the applicants' right to file a divisional application directed to the subject matter thereof.

The Present Invention

To briefly summarize, the present invention is directed to a melt spinning apparatus for spinning a synthetic yarn **12**, wherein the yarn is formed by combining a plurality of filaments and wound to a package **23** by means of a takeup device **20** downstream of the spinning apparatus. The spinning apparatus includes a cooling tube **8** arranged downstream of a spinneret **2** and which is connected to a suction device **15** such that an air stream forms in the cooling tube in the direction of the advancing yarn. This air stream assists the advance of the filaments and leads to a delayed cooling. To ensure adequate cooling of the filaments within the cooling zone, an air supply device **34** is provided for generating an additional cooling air stream which flows in the axial direction of the cooling tube for cooling the filaments downstream of the inlet to the cooling tube.

The invention has the advantage that the initial air stream present at the inlet end **9** of the cooling tube **8** serves to delay the crystallization of the polymer. This ensures that the solidification point of the filaments is inside the cooling tube. For further cooling of the filaments, use is made of the additional cooling air stream that is introduced by the air supply device **34** at a location such that the additional cooling air stream contacts the filament bundle only shortly before or after solidification of the filaments. This influences in particular the evenness of the filament cross sections and results in a high spinning reliability and absence of lint.

In one embodiment, and as illustrated in Fig. 1, the additional air supply device **34** comprises a second cooling tube **35** through which the filaments advance and which is connected adjacent the outlet of the cooling tube and so as to be positioned below the suction generating device, such that the additional cooling air stream flows opposite to the direction of the advancing filaments.

In another embodiment, and as illustrated in Figs. 2-5, the air supply device **34** connects to the cooling tube so that the additional cooling air stream and the initial cooling air stream flow together in the direction of the advancing filaments. Since the two air streams are equidirectional, turbulence is essentially avoided.

The §102 Rejections

Claims 1-5 were rejected as being anticipated by Schippers '909. This prior patent discloses a melt spinning apparatus which includes a pneumatic thread guide tube **16** positioned below the cooling shaft **10**. The guide tube **16** incorporates injector tubes **24** for injecting air to facilitate thread up, note the paragraph beginning at column 4, line 65. In the presently claimed invention, the additional cooling air stream is withdrawn from the cooling tube by the suction generating device. In Schippers however, the air entering through the injector tubes **24** is directed away from the vacuum device **V**, and the vacuum device is inoperative when the injector tubes are operative, note column 5, lines 64-67 of Schippers.

Claims 1-5 were also rejected as being anticipated by Mears. With regard to Mears, the Examiner has apparently considered the funnel **59** to be part of the cooling tube **35**, and the air jets **60** to be equivalent to the claimed additional air supply device. It is submitted that this interpretation is improper. If one were to consider the air jets **60** of Mears to be the claimed additional air supply device, Claim 1 distinguishes over this interpretation by reciting that the additional cooling air stream contacts the filaments only shortly before or after the solidification of the filaments within the tube. In Mears, the air jets **60**, which are designed to prevent the filaments **29** from contacting the inner surface of the cooling tube **35** (note column 7, lines 5-10 of the corresponding U.S. Patent No. 5,976,431), are positioned well

above the solidification point EP (note column 4, lines 2-3 of the corresponding U.S. '431 patent). This spaced relationship is clearly illustrated in Fig. 3.

Claims 1, 2, 4, 10, and 11 were rejected as being anticipated by Katou et al. Katou et al. discloses a melt spinning apparatus wherein the cooling air is supplied in stages of differing temperatures and/or volumes. The Examiner has referred specifically to the embodiment of Fig. 1, and he has taken the position that the upper chimney 4 is equivalent to the claimed gas permeable inlet cylinder, the lower chimney 12 is equivalent to the claimed cooling tube, the exhaust fan 8 is equivalent to the claimed suction generating device, and the blower 14 is equivalent to the claimed air supply device for generating an additional cooling air stream. A fundamental distinction between the Katou et al. apparatus and the present invention is the fact that with the present invention, the additional air supply contacts the filaments only shortly before or after the solidification point. Katou does not suggest this feature. Also, it is unclear from the disclosure of Katou what the exhaust fan 8 in fact exhausts. The fan 8 is mentioned only at column 1, line 27, and there is no further functional description of the fan 8 in the patent. From the drawings of Katou, it appears that the exhaust fan 8 exhausts an interior chamber of the chimney which encloses the filter 7, in which case it would not play any role in generating the initial cooling air stream as claimed. If one interprets the disclosure of Katou to be that the exhaust fan 8 exhausts the air which has been blown in by the fan 6, then the reference fails to disclose the important feature that the introduced air forms an "initial air stream" which extends through the cooling tube, since such introduced air would be exhausted by the upstream connection to the fan 8 as seen in Fig. 1 of the reference, and thus no significant portion of the air would pass through the chimney 12 and form the claimed "initial air stream" in the cooling tube as claimed.

Claims 1 and 13-18 were rejected as being anticipated by Peckinpaugh et al. Claims 13-18 are specific to the embodiment of Fig. 1 of the application, and the Examiner has taken the position that Peckinpaugh shows the claimed additional cooling air stream by the lower arrow 25. However, Peckinpaugh misses the point of the present invention in that there is no teaching or suggestion of using a suction generating air flow in the cooling tube to delay the crystallization of the filaments in

the cooling tube. In Peckinpaugh, a cross flow quench stack is employed in conjunction with a fog of water to quench the filaments, and a high percentage of the quench air passes across the stack and back out into the room as indicated by the arrows 13 (column 3, lines 16-27). Thus only a small percentage of the quench air is drawn along the filaments into the cooling tube (column 4, lines 12-13) and there is no reason to believe this small quantity of air would cause the filaments to solidify within the cooling tube as presently claimed. New Claims 21 and 22 further highlight this distinction, and the recitations of these new claims are clearly supported by Fig. 1 of the application.

The §103 Rejections

Claims 1-6 and -8-9 were rejected as being unpatentable over Geus et al. in view of any of Jarrett, Vassilatos, Martin, and Schilo et al. Geus relates to a fleece making apparatus wherein filaments are extruded in the form of an elongated curtain, and wherein air is circulated by a blower **18** from an outlet slot **10.2** to an inlet slot **10.1** in order to upset the filaments and form a spun bonded mat. This is fundamentally different from the subject matter of the present invention. Also, the Examiner's "reading" of the claim language upon the disclosure of Geus is confusing. For example, it is not apparent how the blower **18** of Geus can be considered equivalent to the claimed suction generating device, nor is it apparent how the vanes **15** of Geus can be considered equivalent to the claimed air supply device. Further, the opening **24** and valve **12** to which the Examiner has referred, cannot be found in the drawings of Geus. In any event however, it is clear that the reference is unrelated to the concept of using an initial air stream to delay the solidification of a filament bundle, and using an additional cooling air stream to assure adequate cooling of the filament bundle, as claimed.

The four secondary references have been cited to show that it is known to gather an advancing filament bundle to form an advancing yarn, and then wind the yarn into a package. There is no question that with respect to yarn processing, such gathering and winding steps are per se well known. However, there is no basis to combine this knowledge with the apparatus of Geus, since the apparatus of Geus is

designed and intended to produce a mat in the form of a flat curtain, and there is no teaching of how such a curtain could be gathered and then wound to a package. Nor is there any apparent reason or suggestion for attempting such a modification of the Geus apparatus. Thus the combination of references as proposed by the Examiner would not be obvious.

Claims 1 and 13 were rejected as being unpatentable over Gehrig et al. in view of the same four secondary references cited in the previous rejection. Gehrig relates to the manufacture of a non-woven web, and thus is also non-analogous to the present invention. Also, the air introduced at 22 of Gehrig, which the Examiner has analogized to the claimed additional cooling air stream, is not withdrawn from the cooling tube by the suction generating device as recited in Claim 1, note Fig. 3 of Gehrig. Thus even when Gehrig is considered collectively with the four cited secondary references, the claimed invention does not result.

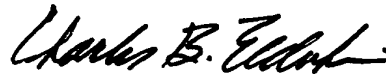
The Replacement Drawing Sheet

As indicated above, a replacement for sheet 2 of the drawings is attached to this Amendment. The replacement sheet contains Fig. 2, and the only change from the original Fig. 2 is the addition of the numeral 34 which identifies the air supply device.

Conclusion

For the reasons set forth above, it is respectfully submitted that all of the pending claims are in condition for immediate allowance, and such action is solicited.

Respectfully submitted,



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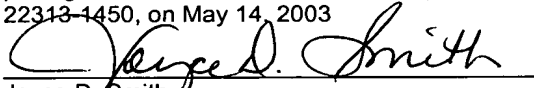
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